Fall 2015

DEPARTMENT OF BIOLOGICAL SYSTEMS ENGINEERING NEWSLETTER, FALL 2015

Bringing Engineering to Life

Biological Systems Engineering

UNIVERSITY OF NEBRASKA-LINCOLN
FALL 2015

From the Department Head

Mark Riley

Hello. It is my pleasure to provide an update on the Biological Systems Engineering Department at the University of Nebraska-Lincoln. It has been a busy time in the department as we continue to grow. Our research, extension, and instructional activities are going very well, and as a result, we have been able to hire a number of excellent new individuals who have joined us in Lincoln and across the state.

Joining our faculty ranks in July are Dr. Amir Haghverdi (Irrigation Engineer at the Panhandle Research and Extension Center in Scottsbluff) recently from University of Tennessee and Dr. Daran Rudnick (Irrigation Engineering at the West Central Research and Extension Center in North Platte) an alum of the UNL-BSE department. Both have positions in research and extension. In August, Dr. Nicole Iverson came on board from a recent post doctoral program at MIT to support our biomedical engineering area; her research utilizes specially functionalized nanofibers that act as sensors of inflammation. She also will be teaching to support our engineering programs. Soon to join us is Dr. Troy Gilmore from NCSU who will have a research and extension position focused on groundwater hydrology. His position is 70% in UNL's School of Natural Resources and 30% in BSE. Then in January of this next year, Aaron Mittlestet will begin a research and teaching appointment in watershed hydrology. He is completing his Ph.D. degree at Oklahoma State University. All are tenure track faculty, and we are very fortunate to have them join our department. We currently have three open faculty searches and two more about to begin.

Similar to last year, we had a remarkable number of awards bestowed upon our faculty, staff, students, and alumni as you will see in this newsletter.

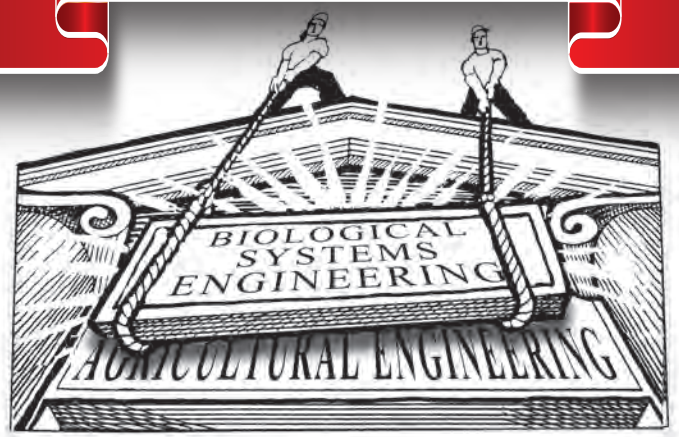
This past July, we also had two retirements of long time faculty members: Dr. Dean Eisenhauer and Mr. David Shelton. They both were profiled in our Spring 2015 Newsletter. Much of Dave Shelton's career has been at the NEREC in Concord, NE, where in recent years he has focused on stormwater management. Dean Eisenhauer most recently has been teaching and performing research on water resources (both water quality and quantity), has been teaching irrigation and soil and water courses, and developed the UNL-DWFI-UNESCO-IHE double degree program. UNESCO-IHE Institute for Water Education is the prestigious and largest international postgraduate water education facility in the world and is based in Delft, Netherlands. Celebrations were held for distinguished faculty this past June.

As you will see on this and the facing page, we have reached a milestone in the department – 25 years as Biological Systems Engineering. Our activities and people have changed substantially over that time, but our commitment to excellence, to support of students and the public, has not wavered. Come help us celebrate on campus on November 20th. We hope that you can join us.

Best regards,
Mark Riley
Department Head
Biological Systems Engineering
University of Nebraska-Lincoln

25th Anniversary Celebration

from Agricultural Engineering to Biological Systems Engineering



November 20, 2015

4–5:30 pm
Open House Tours
Chase Hall & Splinter Labs

5:30 pm
Program & Hall of Fame Dinner*
Taco Bar*
East Campus Union
Great Plains Room

RSVP* by Nov. 11 to:
Eileen Curtis
200 ChaseHall, UNL
Lincoln, NE 68583-0726
Phone: 402-472-3905
ecurtis1@unl.edu

*Notify also if you have dietary restrictions.

Biological Systems Engineering Department Newsletter

Mark Riley..... Editor
Julie Thomson..... Editorial Coordinator
Sheila Smith..... Graphic Artist
Lance Todd ..... Cover Art: Chase Hall in 1980's (B & W) and now.
Contributors: Greg Bashford, Evan Curtis, Eileen Curtis, Mitch Goedekin, Derek Heeren, Dylan Horrocks, Suat Irmak, Paul Jasa, Deepak Keshwani, Jenny Keshwani, Joe Luck, Mitch Maguire, Troy Nelson, Ethan Nutter, Lameck Odhiambo, Angela Pannier, Amber Patterson, Santosh Pitla, Ben Rice, Teresa Ryans, Amy Millmier Schmidt, Vivek Sharma.

75 Years as Agricultural Engineering

25 Years as Biological Systems Engineering

"I led the faculty to change the name of the Department to Biological Systems Engineering (in 1990)," **Dr. Glenn Hoffman**[1] reported in **Dr. William Splinter's** department history document[2].

The request to change the department name, presented to the Board of Regents, signed by Chancellor Massengale, explained that of 53 universities offering agricultural engineering or closely allied degrees, 20 had changed their names and emphasis to include a reference to biological engineering. The document explained:

> "The Department of Agricultural Engineering was established at the University of Nebraska in 1908. The agricultural and food industries have changed considerably since then and the name 'Department of Biological Systems Engineering' is more indicative of the current and projected role and mission of the department. The new name should more accurately reflect the research and educational activities of the department and enhance student recruitment for the rapidly expanding area of biological engineering. Since industry opportunities for engineers in agricultural and in biological engineering are closely allied, it is prudent to accommodate both in the same department.
>
> The administration and management of the department will remain unchanged. The needs of the agricultural and food industries will continue to be served by the department, as well as a portion of the biological sciences that require engineering solutions. With UNL's increased emphasis in food processing and industrial uses for agricultural products, the scope of the department's program emphasis is broadened."

During his tenure, Hoffman developed and implemented a new engineering program in Biological Systems Engineering, revised the Agricultural Engineering major, developed and implemented an interdepartmental major in Water Science, and renamed and revised the Mechanized Agriculture technology major to Mechanized Systems Management. He stated:

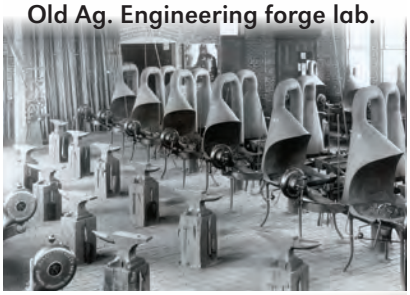
> "Research efforts in the department were focused into four areas (engineering soil and water environments, bioprocess engineering for adding value, engineering for spatial and temporal variability, and biomedical engineering). Research grant funding more than tripled. In extension, grant funding increased five-fold and activities were focused on priority initiatives to increase agricultural profitably, conserve and manage natural resources, and enhance water quality . . . from 1989 until 2003, twelve faculty positions were filled and all eligible faculty members were tenured and promoted. Through two National Science Foundation grants and financial support from the University, more than 6,000 square feet of space was renovated into five state-of-the-art research laboratories in 1995. Funds from the University in 1999 provided new laboratories on gas emissions and tissue culture and a 900 square foot laboratory for biological engineering. All five classrooms in Chase Hall were completely renovated in 2001-2002."

Chauncey W. Smith at a 1950's tractor demonstration.

The *Lincoln Journal Star* (March 21 & 22) reported that UNL had the status of "the only biological engineering department in the world." *Daily Nebraskan* (July 19) reported the BSE change with a name change for the College of Agriculture. The 25 yr. celebration will be held in conjunction with the Hall of Fame banquet.

1 Agricultural Engineering Department Head 1989-2003
2 (http://tractormuseum.unl.edu/downloads/BSE_History_reduced_size.pdf).

Old Ag. Engineering forge lab.



New BIBA lab Chase Hall.

1990
Degrees in Biological Systems Engineering and Water Science were initiated.

1990
The department changed its name to Biological Systems Engineering, one of the first accredited programs of its kind in the country.

1991
The Mechanized Agriculture program was renamed Mechanized Systems Management. The graduate engineering program was entitled Agricultural and Biological Systems Engineering.

Informing Congress: The Future of Science and Research

Dr. Angela Pannier (center) and two of her fellow Science 2034 panelists at the U.S. Capitol on June 24.

Dr. Angela Pannier, Associate Professor and William E. Brooks Fellow, was one of six federally funded researchers from across the United States invited to be part of the Science Coalition's SCIENCE 2034 briefings on Capitol Hill in June. SCIENCE 2034 is an initiative focused on making educated predictions about how well-funded scientific research can change the world within the next 20 years. Panel members discussed their research and the probable advancements that will be made in briefings for both the Senate and the House.

Pannier discussed her multidisciplinary team that is developing a new model for vaccine development and delivery. For this work, Pannier collaborates with experts in food science, virology, mathematical modeling, and biology of infectious diseases. "We have assembled a fantastic team of experts at UNL and UNO that is well-positioned to achieve vaccination goals," Pannier said. "However, like many of the topics discussed at SCIENCE 2034, our goals will only be made possible with sustained research funding over a long period of time." In the briefings Pannier highlighted that the goal was "to *not* talk about what we have done, but instead talk more about what we *could* do, given sustained funding, over the next 20 years."

Other topics discussed during the briefing included energy sources, finding life on other planets, and medical advancements, such as Pannier's work to make oral DNA vaccines that are easy to store, transport and administer, which could save millions of lives annually and make responses to pandemics much more rapid. Funding for vaccine research is critical, she believes, because the pace of current vaccine development will not be able to keep up with multiplying infectious disease threats, such as rotavirus, toxoplasma, and pandemic influenza.

Along with the opportunity to meet members of Nebraska's congressional delegation, Pannier said the briefings were opportunities to show how valuable federally funded research is to the scientific community and the world, "It was a really nice platform to let them really see how that money is spent and how it comes back into the economy and the community–it pays for graduate students, for university employees, for supplies. Research is going to come up with all these great things, great discoveries, but we're also going to create a workforce. It's nice to be able to talk about that and have a platform."

Dr. Pannier was also featured in the "Faces to Watch" section of IANR's *Growing a Healthy Future* Spring 2015 edition: http://ianr.unl.edu/img/magazine/IANR-growing-spring-2015.pdf

The work of Dr. Pannier's group is highlighted in IANR's "One Environment, One Health" initiative: https://youtu.be/cUiuWfvQCO4

ASABE Unmanned Aerial Systems Committee

The American Society of Agricultural and Biological Engineers (ASABE) formed a new technical committee focused on unmanned aerial systems (UAS) designated MS-60. Joining more than three dozen established committees in the Society's Machinery Systems technical community, the UAS committee, will focus on research, education, and the development of standards pertaining to this rapidly expanding area of the agricultural industry. Chaired by **Wayne Woldt**, BSE Associate Professor, MS-60 will address the development and applications of unmanned aerial systems in agriculture, associated autonomous control systems, integrated multi-mode sensor payloads, data links and communication systems, and synthesis of UAS-derived data across the full scope of ASABE technical interests.

Wayne Woldt

Ph.D. student Mohammed Alwatban demonstrates TCD on Dr. Edward Truemper.

Dr. Bashford explains the data on the monitor.

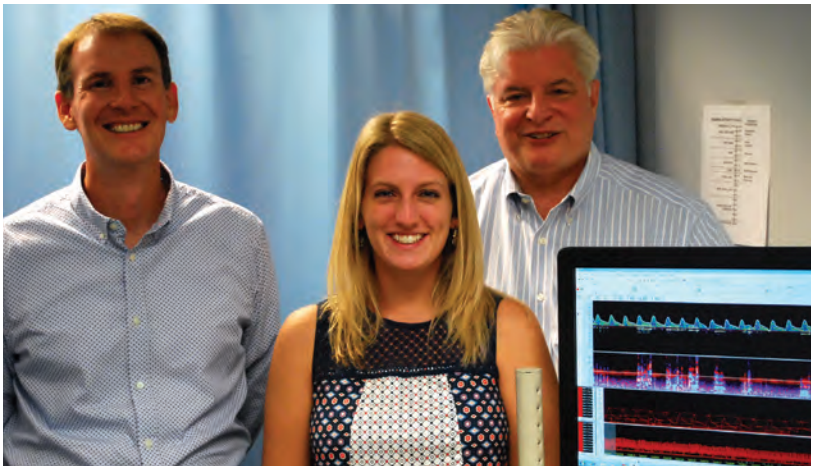
BSE & Children's Hospital of Omaha Collaborate on Gerber Foundation Grant

In the United States, over 55,000 infants are born with congenital heart disease each year, many of whom require one or more cardiac surgical procedures during the first year of life. Tragically, brain injury (both acute and long-term) is frequently an unintended complication of cardiac surgery in pediatric patients. BSE's **Dr. Greg Bashford**, Biomedical Engineer, and **Dr. Edward Truemper**, pediatric intensivist at Children's Hospital and Medical Center of Omaha and BSE Adjunct Professor, are collaborating to provide data and improve instrumentation to address the circumstances for many infants undergoing cardiac surgery. They have been awarded a Gerber Foundation grant for this "tiny hearts" study. The grant will fund the largest known study of monitoring brain blood flow during cardiac surgery on pediatric patients.

Bashford and Truemper began collaboration eight years ago. The impetus for this project was the need for noninvasive monitoring of cerebral blood flow in children at risk for brain injury. They explain, "If successful in our long-term goals, the technology developed by findings from this proposal may be applied *immediately* for the benefit of infant health." Bashford's Biomedical Imaging and Biosignal Lab (BIBA) will monitor infants and acquire data from Children's Hospital's cardiac surgical operating room and pediatric ICU.

The Gerber Foundation grant will be used to refine and optimize a novel transcranial Doppler (TCD) instrument that provides immediate real-time feedback to clinical personnel, operates automatically without need for manual intervention, and does not encumber any procedure during surgery. By the end of the study, this system will be wireless and able to transmit real-time feedback on cerebral hemodynamics to a tablet computer. The collaborators also plan to evaluate the correlation between surgical maneuvers, emboli burden, and altered cerebral blood flow dynamics in an infant population undergoing surgical palliation or repair by cardiac surgery, and who are placed on cardiopulmonary bypass as part of their operative management. They will monitor 100 infants undergoing cardiac surgery that meet the criteria.

The collaboration between Bashford and Truemper has already resulted in two completed projects to improve the utility of the monitoring system and its ability to maintain a consistent signal. It is expected in six months they will be monitoring children during cardiac surgery as the first stage of the Gerber Foundation grant. Another outcome of the collaboration is the facilitation of continuous quality improvement in pediatric cardiac surgery. Graduate student **Lauren Wondra** is supported on this grant as part of the BIBA team.



Dr. Greg Bashford, Lauren Wondra (M.S. student) and Dr. Edward Truemper.

Our Faculty and Staff

Subbiah Receives USDA Food Safety Grant

Jeyamkondan Subbiah

Jeyamkondan Subbiah, Kenneth E. Morrison Distinguished Professor of Food Engineering in BSE and food science, is project director on a $5 million USDA food safety grant to enhance low-moisture food safety via development and implementation of improved pasteurization technologies. (UNL will receive $943,617 over five years.) Research on bacteria in low-moisture products is not well developed because people have always thought these products were safe. "Now that the risk has been recognized, we need to find technologies to improve their safety and validate the effectiveness of the technologies," Subbiah said. The research will look at radio frequency and extrusion processing of low-moisture products to inactivate the bacteria. Traditionally, the food product is heated from outside to inside, but technology using electromagnetic radio frequency waves will volumetrically heat the product. The impact on food quality is minimal, and it can be more evenly heated to inactivate bacteria.

Low-moisture foods, such as nuts, spices, and peanut butter have been considered at low risk for causing foodborne illness because they are consumed in a dry state. While microbial growth isn't possible, bacteria can survive and stay on food for a long time.

Foodborne pathogens, such as salmonella even at low levels, can cause illness to sensitive populations. "You don't need a million bacteria to cause illness; as few as 10 cells can cause illness," said project director Harshavardhan Thippareddi, UNL Department of Food Science and Technology professor and Nebraska Extension food safety specialist. Outbreaks and recalls due to salmonella and other pathogens led Congress to pass the 2011 Food Safety Modernization Act, mandating food processors guarantee the safety of their products. However, it is extremely difficult to kill bacteria on low-moisture products; current pasteurization methods take significant time and can compromise quality. UNL research will focus on technologies that can kill the bacteria while not affecting quality.

Extension is a critical part of this grant. UNL will disseminate its findings to local food processors in Nebraska and across the country and work with them to meet new food safety regulations. Principal co-investigators with UNL are from Michigan State University, Washington State University, Illinois Institute of Technology, and North Carolina State University.

Exerpted from UNL Today *6/1/15.*

Outstanding Staff

Evan Curtis, Student Services Coordinator, was honored as Oustanding Staff by the Engineering Student Advisory Board (eSAB)and the College of Engineering.

Amber Patterson was selected recipient of the College of Engineering Staff Award for Exemplary Service and Support. She was commended for outstanding service and support towards achieving the vision and mission of the college.

Nebraska Hall of Agricultural Achievement

Paul Jasa

Two members from our department were elected to the Nebraska Hall of Agricultural Achievement in March. Formed in 1916, the NHAA is dedicated to preserving and improving Nebraska agriculture.

Extension engineer **Paul Jasa** has developed educational programs related to no-till equipment and system management since 1978. He manages research and demonstration projects at UNL's Rogers Memorial Farm.

Jack Schinstock

Jack Schinstock, emeritus professor of biological systems engineering, also served as assistant dean and associate dean of the College of Agricultural Sciences and Natural Resources. He helped students obtain financial aid, created scholarship programs for community college transfer students, and developed the CASNR study abroad program.

2015 ASABE International Meeting Awards

ASABE Fellows

David D. Jones, P.E., associate dean for undergraduate programs, College of Engineering, and BSE professor was inducted as a Fellow for his extraordinary contributions in engineering education, accreditation, and in the transitioning of biological systems engineering while enhancing agricultural engineering.

Roger M. Hoy, BSE professor and Nebraska Tractor Test Laboratory director, was inducted as a Fellow for his outstanding leadership contributions in the teaching and mentoring of graduate and undergraduate students, in tractor and performance related research, and in the development of national and international agricultural tractor and equipment safety standards.

ASABE Educational Aids Blue Ribbon Awards

Publications (print or electronic)

- B. Holm, **D. Shelton, K. Feehan**, K. Holm, S. Rodie, **T. Franti,** "Stormwater Management: What Stormwater Management Is and Why It Is Important" (G2238) University of Nebraska Extension.
- R. Sutton, S. Rodie, **D. Shelton**, "Stormwater Management: Green Roof Basics" (G2244) University of Nebraska Extension.
- B. Holm, **D. Shelton, T. Franti, K. Feehan,** S. Rodie, "Stormwater Management: How to Make a Rain Barrel" (EC2001) University of Nebraska Extension.
- D. Schmidt, E. Whitefield, **Crystal Powers,** J. Pronto, P. Knox, G. Hawkins, D. Smith, **Jill Heemstra,** "Animal Agriculture in a Changing Climate" website.
- D. Smith, S. Mukhtar, **R. Stowell** "Advanced Application Techniques – Making the Most of Your Manure Responsibility" TAMU, UNL.

ASABE Presidential Citation

Mark Riley (left in photo) BSE Department Head was recognized by ASABE President Terry Howell for extraordinary service and invaluable contributions to the Society for his work in chairing, coordinating, and leading the Biological Engineering presidential task force, which reviewed and modified the definition of Agricultural and Biological Engineering within ASABE for the Member Roster and the website, and which developed liasons with other biological organizations, resulting in efforts such as the Ag and Bio Ethics Essay Competition for undergraduate and graduate students.

Heermann Sprinkler Irrigation Award

William Kranz received the 2015 Heermann Sprinkler Irrigation Award in recognition of his outstanding contributions toward the advancement and worldwide adoption of sprinkler irrigation systems. He is a professor in the department and works as an extension irrigation specialist at the Haskell Agricultural Laboratory and interim co-director.

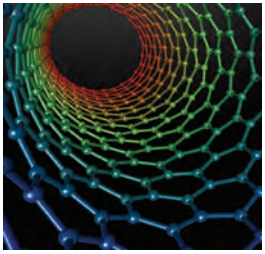
Holloway Award

Joe D. Luck received the 2015 Gale A. Holloway Professional Development Award for his exemplary support of career development and membership activities for ASABE preprofessional members in all levels of the Society.

Ergonomics, Safety and Health Award

Aaron Yoder, is the recipient of the 2015 SMV Technologies Ergonomics, Safety and Health Award for his outstanding leadership contributions to agricultural safety and health education and program development, ergonomic evaluation, injury surveillance and tracking, and service to ASABE.

Nanotube Sensor Research



Dr. Nicole Iverson's (new BSE Assistant Professor) research will utilize the carbon nanotube sensors that she helped to develop in her postdoctoral work at Massachusetts Institute of Technology to discover what specific reactions take place during disease progression. She plans to start by focusing on nitric oxide which, in her opinion, "is one of the least appreciated and understood reactive molecules in the body due to the fact that it degrades so quickly and has been impossible to track over extended time scales in living systems." With the new sensors created at MIT, there is now a system to track these analytes and bring a deeper understanding to the inflammation process.

The work was featured in *Nature* (http://www.nature.com/news/nanotube-implants-show-diagnostic-potential-1.18219?WT.mc_id=TWT_NatureNews). They reported, "The MIT team has also developed a sensor that can be inserted beneath the skin to monitor glucose or insulin levels in real time. . . . Another version of the sensor, developed . . . by biomedical engineer Nicole Iverson and colleagues, detects nitric oxide. This signalling molecule typically indicates inflammation and is associated with many cancer cells. When embedded in a hydrogel matrix, the sensor kept working in mice for more than 400 days and caused no local inflammation . . . The nitric oxide sensors also performed well when injected into the bloodstreams of mice, successfully passing through small capillaries in the lungs, which are an area of concern for nanotube toxicity. Iverson, who is starting her own lab at the University of Nebraska–Lincoln, plans to further develop the nitric oxide sensors for cancer treatments. For example, surgeons might use the device to determine whether they have removed every tumour cell from a patient."

Iverson told *Nature*, "You hear that a surgeon will say, 'I think we got it all.' If we can detect a single inflamed cell, then they'll know they got it all." In addition to her research, she will be spending time with BSE students, she told *IANR News Now* (Sept. 17, 2015) "I enjoy watching students as they comprehend a difficult topic for the first time or see their pride in showing data from an experiment that they planned and executed on their own. I am excited to teach classes on a more regular basis and help students in my lab become accomplished scientists."

Research and Creative Activity Award

Lameck Odhiambo, BSE Research Assistant Professor for Water Resources Engineering, received the College Faculty Research and Creative Activity Award presented annually in the College of Engineering for activities associated with investigation or experimentation aimed at the discovery and/or interpretation of facts as well as the development of creative works or new products. Odhiambo is a member of **Dr. Suat Irmak's** team; Irmak oversees the research projects. Current research includes: development/modeling methods of estimating evapotranspiration, transpiration and soil evaporation; soybean crop water productivity studies investigating the effects of plant population on water use and yield under water limited conditions; a centralized irrigation water use database for the Middle Republican Natural Resource District; quantification of evapotranspiration, transpiration and soil evaporation in tilled and no-till fields under maize-soybean cropping systems; comparisons of water balance components and crop water productivity in subsurface drip irrigation and center pivot irrigation systems; flux measurements of water and energy for different surfaces; and impact of rotational cover crops on soil quality parameters, soil water holding capacity, soil-water retention curves, and field-scale water balance dynamics.

From left: BSE Head, Mark Riley, Lameck Odhiambo, and CoE Dean Timothy Wei.

Faculty of the Year

Joe Luck was nominated by his UCARE student Melissa Kesterson and received eSAB Faculty of the Year at the College of Engineering awards banquet

Animal Waste Management

The Institute of Agriculture and Natural Resources featured **Dr. Amy Schmidt's** animal manure management work in "One Environment, One Health" initiative: https://youtu.be/cUiuWfvQCO4. She focused on the value of manure as a source of nutrients for agricultural crops. Proper management of this resource is critical to environmental quality and the health of animals and people.

BIOLOGICAL SYSTEMS ENGINEERING

HALL OF FAME

Glenn D. Johnson

Glenn Johnson
Courtesy Lower Platte South NRD

Glenn Johnson is this year's BSE Hall of Fame inductee and will be recognized at the banquet on November 20. He has been employed by the Lower Platte South Natural Resources District since 1972, serving as Assistant General Manager until 1982 when he was named General Manager. He also serves as Chair of the Joint Antelope Valley Authority.

Glenn learned about conservation and resources management first-hand growing up on a grain and livestock farm in northeast Nebraska. He and his wife, Eileen, now live in Lincoln.

Glenn attended the University of Nebraska-Lincoln receiving a Bachelor's Degree in Agricultural Engineering in 1972. He received a Master's Degree in Public Administration from the University of Nebraska-Omaha in 1993.

He is a member of the National and Nebraska Chapters of the American Society for Public Administration, the Nebraska Stormwater and Floodplain Managers Association, and is a Nebraska Director and Past President of the National Water Resources Association.

Glenn is the voting representative for the District on the Nebraska Land Trust Board of Directors and serves as the Trust's Vice-Chair.

Dr. Santosh Pitla explains robotics at the Nebraska State Fair.

John Hay helps State Fair visitors build solar cars.

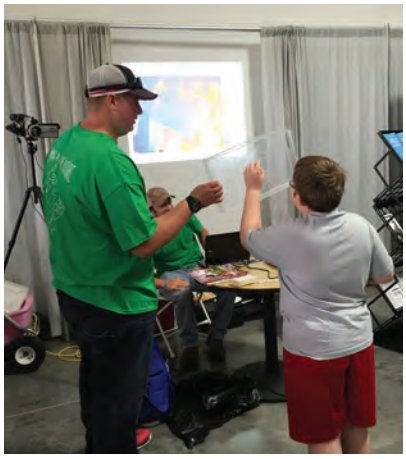
Community Outreach

The BSE department participates in community outreach efforts each year. Faculty, students, and staff work together to provide Nebraska's families with a variety of learning opportunities. The Nebraska State Fair participation included hands-on activities that taught topics such as heat transfer, renewable energy, robotics, and tractor testing (from the Larsen Tractor Test and Power Museum). BSE was featured in two of the State Museum's "Sunday with a Scientist" programs: one focused on experiences and careers in biological systems engineering; the other featured UNL Quarter Scale Team. Bright Lights school enrichment program brings middle school students from their week-long engineering camp. Bright Lights students spent time in the labs of Drs. Pannier and Bashford, and at Nebraska Tractor Test Lab, and on solar cars with John Hay.

Nebraska State Fair

BSE students guide the making of squishy circuits.

James Howe (MSYM) demonstrates thermal imaging.



Evan Curtis helps test fan blade designs at "Wired for Wind," where youth learn about wind turbine capacity to generate electricity.

Sunday with a Scientist

John Hay's solar car construction.

Grad student Ellen Emanuel with a biofuel experiment.

Dr. Deepak Keshwani explains yeast balloons; Roman Mabie shows his.

Bright Lights Engineering Camp

Bright Lights students discover brain imaging with grad student Ben Hage.

Dr. Angie Pannier explains alginate scaffolds to Bright Lights students.

Lauren Wondra (graduate student) adjusts Doppler equipment.

Community Outreach

Bright Lights Engineering Camp

NTTL engineers Doug Triplett (MSYM 2008) and Justin Geyer (AGEN 2004) explain the dynamometer (left) and rotational speed measurements (right).

Jared Werner (grad student) supervises a group as they learn about hydraulic components.

Greg Frenzel (MSYM) shows hydraulic controls on the demonstration table.

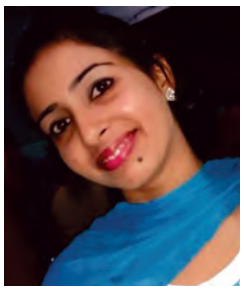
Josh Murman (AGEN) and Thomas Hoff (AGEN) supervise the torque demonstrator.

John Hay holds a solar car activity in front of Chase Hall.

Our Students

Irmak research team member and Ph.D. student **Vasudha Sharma** received the Shear-Miles Agricultural Graduate Fellowship Award.

Meetpal Kukal



Rupinder Sandhu

M.S. students **Meetpal Kukal** and **Rupinder Sandhu** received the Widaman Distinguished Graduate Fellowship Award.

Chris Davidson

Christopher Davidson, a senior Biological Systems Engineering major, earned an honorable mention for the Goldwater scholarship for his biomedical research under **Dr. Angela Pannier.** He was also a candidate for Homecoming King.

Bethany Brittenham

Bethany Brittenham (BSEN) received the College of Agriculture and Natural Resources (CASNR) Outstanding Student Organization Officer Award. She was one of eight nominees from across IANR for this award. Her leadership with the ASABE Student Branch and the Fountain Wars Team were recognized.

What's New?
Update your alumni profile at:
bse.unl.edu

Inclusion in the newsletter is optional.

Vasudha Sharma

Vasudha Sharma (Ph.D. student under **Dr. Suat Irmak's** supervision) received the Second Place award at the 2015 ASABE Conference for her work with Dr. Irmak titled "Soil Water Dynamics and Evapotranspiration of Cover Crop Mixtures in Seed Maize-Cover Crop Rotation Fields" from the Association of Agricultural, Biological & Food Engineers of Indian Origin. The award has been instituted to recognize excellence among members in the conduct and presentation of research related to agricultural, food and biological engineering.

Vivek Sharma

Vivek Sharma (former M.S. and Ph.D. student and current post-doc, all under **Dr. Irmak's** supervision) received the Boyd-Scott Graduate Research Third Place award at the 2015 ASABE Conference for his work with Dr. Suat Irmak and Dr. Ayse Kilic titled "Impact of Scale/Resolution on Sebs-Derived Evapotranspiration from Landsat and Modis Images." The award recognizes excellence in the conduct and presentation of research to build the knowledge base needed by engineers who design equipment, facilities and processes for the sustainable operation of a biological system.

Keith Miller

Keith Miller (graduate student) was selected and recognized as an outstanding Natural Resources and Environmental Sciences (NRES) student presenter at the 2015 AIM in New Orleans. His poster "Comparing Agricultural Field Characteristics to Different Levels of Irrigation Control" was extremely well done and significantly added to the body of knowledge in the Natural Resources and Environmental Systems technical community.

Franco's Award

Vice Chancellor Franco's initiative seeks to honor students who have demonstrated instances of character or integrity that go above and beyond that of others. **Dr. Roger Hoy** *(left)* nominated **Luke Prosser** *(right)* based on his care and assistance with **Caleb Lindhorst** *(center)* who returned to UNL following a severe accident. Among 30 Franco's List awardees, Luke's nomination stood out as unique for his compassion towards another student. Luke is a prime example of the exceptional students we are lucky to have here in BSE. Both Caleb and Luke are members of the Quarter Scale Tractor Team. Luke graduated in May.

Mechanized Systems Management

Bringing it Home

Ben Rice, Mechanized Systems Management major, grew up in the dairy industry in his family's Prairieland Dairy. As a result, he began to see the bigger picture of agricultural systems and has developed a unique career pathway.

He visited various dairy farms in California a few years ago, two of which had methane digesters that were shut down. He began thinking about how to make these systems work and be profitable across other agriculture industries.


ABCDproduction

Now Ben manages Prairieland Gold, Prairieland Dairy's compost operation. He started collecting all food waste from local school cafeterias for composting at the dairy. He says Prairieland Gold receives 86% of the cafeteria waste, which has a huge impact on what is going to the landfill.

Ben and his brother-in-law, also an employee on the dairy, give presentations to organizations and businesses on collecting food waste for compost. The two now collect waste from Innovation Campus, a Russ's Market in Lincoln, some Wal-Mart stores in Omaha and a dog food plant in Crete, and plan to add Pinnacle Bank Arena to the list.

Ben is an advocate for the ag industry. He has spoken at local grocery stores, along with a cow and calf from the dairy, to connect consumers with an understanding of where their food comes from. He has mastered skills in production, finance, management and research and is encouraging more people to do the same. When he's facilitating leadership conferences or visiting schools, he's encouraging students about their potential to do even more.

Ben hopes to have a career designing agricultural facilities and various operations, anything from processing plants to livestock barns and methane digesters.

Quarter Scale X-Team Takes 1st Place

UNL's Quarter Scale Tractor X-team took 1st place at the American Society of Agricultural and Biological Engineers (ASABE) annual competition at Peoria, IL, May 28-31. The X-team is comprised of mainly sophomores and freshman who work on product improvement for the tractor built by the previous year's A-team of mainly juniors and seniors, which placed 10th in 2014. X-team captain **Turner Hagen**, a mechanized systems management major, led a group of 26 students against the 14 other teams in their division; University of Illinois held 2nd place, Iowa State was 3rd. The X-team received 1st place in both written design and the team presentation, those points were added to their scores in tractor pulling. The improvements they made to the tractor included the exhaust system and electrical modifications. **Drs. Roger Hoy** and **Joe Luck** are the advisors for Quarter Scale.

UNL Quarter Scale Teams pictured below:
(from left) Roger Hoy, Jake Walker, Turner Hagen, Jake Will, Eric Rosewicz, Josh Murman, Caleb Lindhorst, Mandy Van Sant, Ian Schuster, Kye Kurkowski (back), Sydney Gard (front), Bob Olsen, Zak Kurkowski (back), Taylor Wachholtz (front), Austin Hines, Anna Siebe, Micah Bolin, Ryan Hanousek, Rachel Noe, Greg Frenzel, Natalie Howery, Dan Kent, Luke Prosser, Travis Classen, Ethan Mosel, Colton Rathman and Jason Shultis. X-Team tractor on left, A-Team tractor on right.

Fountain Wars Competition

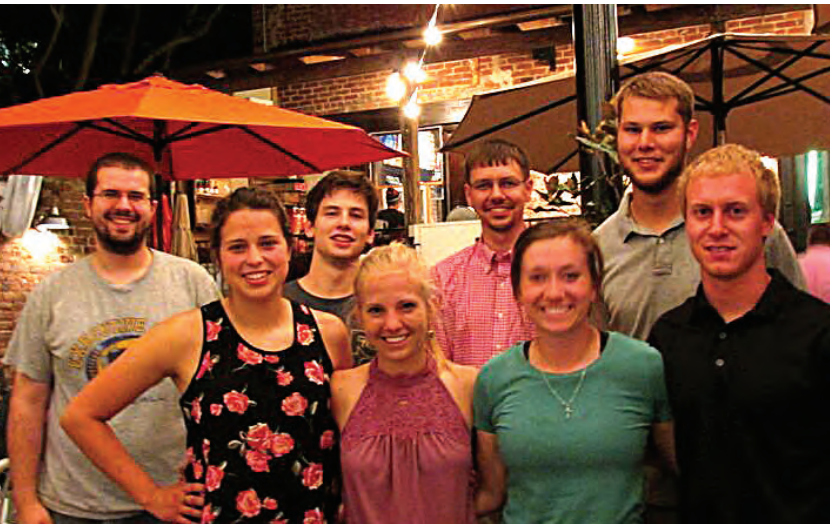
The UNL Fountain Wars Team took 2nd at the 2015 American Society of Agricultural and Biological Engineers (ASABE) International Meeting! This year's competition was held in New Orleans, a place known for its distinct Creole culture and vibrant history.

Fountain Wars is a hands-on competition in which a team of up to six students design a fountain to complete challenges using the necessary PVC pipes, couplers, fittings, valves, nozzles, and pumps. Awards are based on the combined scores of a written report, oral presentation, poster, construction, technical tasks, and aesthetic display. The 2015 competition tasks were "Floating the River" and "Basketball Shootout," similar to previous years' tasks; the primary project constraint is the exclusive use of water power in the final design.

"Floating the River" required each team to float a raft around the outer ten inches of the pool, with points being awarded for every full revolution. UNL's design included a semi-circle donut shaped channel that separated a small amount of water from the main body of the pool; the track had inlets at the bottom where water was pumped in a circular direction, which helped to conserve pump energy and increase total revolutions of the raft. The design for the "Basketball Shootout" included a water wheel, bike rim, and throwing arm. As the connected water wheel and bike rim began to spin, a cord was wrapped around the bike rim until enough tension was built up to engage the throwing arm to project the ball towards the basketball hoop, with each successfully made basket being awarded points.

Check out BSE's UNL Facebook page to see more pictures and videos from the competition.

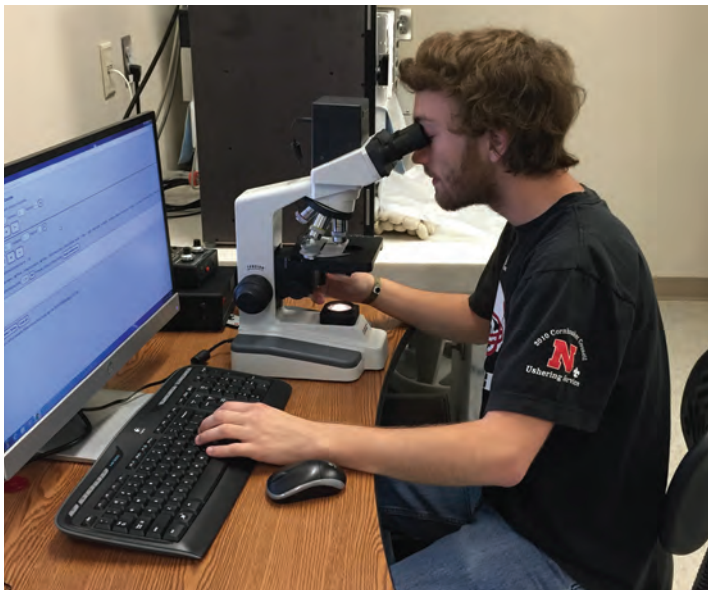
A special thank you to all 2015 sponsors: Flowserve, **Dr. Deepak Keshwani**, The Flatwater Group, Inc., **Dr. Derrel Martin,** Diamond Plastics Corp., WISH Nebraska, Inc., **Patrick Walsh, Dr. Curtis Weller, Dr. Joe Luck,** and **Dr. John Gilley**. Additional technical expertise was provided by **Alan Boldt, Ryan Freiberger, David Mabie,** and **Scott Minchow**.



Fountain Wars Team. Front: Co-Captain Bethany Brittenham, Co-Captain Julia Burchell, Anna Siebe, Mitch Maguire. Back: Advisor David Mabie. Doug Rowen, Advisor Dr. Derek Heeren, Mitch Goedeken.

UCARE Algae Research

UNL's Undergraduate Creative Activities and Research Experience (UCARE) program supports undergraduates to work with faculty mentors in research or creative activies. **Troy Nelson** (undergraduate student in BSE) did research as a UCARE student this summer investigating the optimal dilution factor for beef manure digestate to grow algae. He presented his project, "Optimization of Algae Production from Beef Manure Digestate" during the Nebraska Summer Research Symposium. Faculty sponsors: **Amy Millmier Schmidt** and **Yufeng Ge.**



Troy Nelson using a hemocytometer to quantify the amount of algae in the solution.

Holding container for algae.

Energy Sciences Research

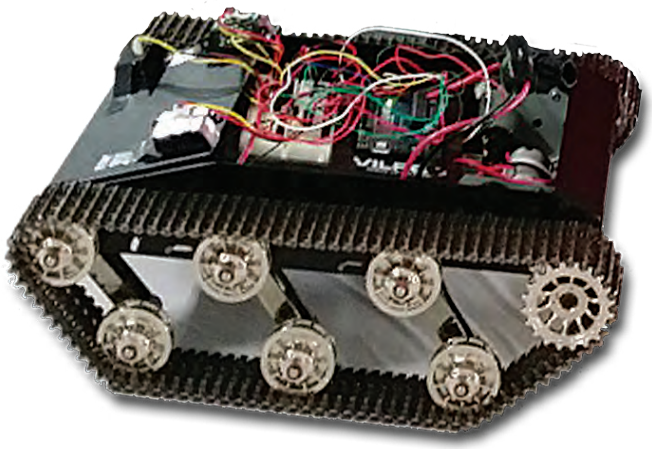
Dr. Yufeng Ge and Mitch Goedeken (right) with algae samples.

Mitchel Goedeken (M.S. student in BSE) is working on a collaborative project among BSE and Animal Science faculty to optimize algae production from beef feedlot runoff holding pond effluent. Mitch spent this summer conducting laboratory-scale manure digestion and algae production research in the Schmidt2 Lab and helping complete construction of a pilot-scale system at the ARDC near Mead, NE to digest beef manure and produce algae that can be harvested for energy and cattle feedstock research. Goedeken's project is funded by a grant from the Nebraska Center for Energy Sciences Research (NCESR). Faculty advisors: **Amy Millmier Schmidt** and **Yufeng Ge.**

Ethan Nutter

Reactive Intelligence Development of a Mobile Agricultural Robot

Under the supervision of **Dr. Santosh Pitla**, **Ethan Nutter** was the first MSYM student in ten years to participate in the UCARE program. His robotics project included the hardware and software for the robot, an explanation of the benefits of fuzzy logic and how the robot "sees." His poster also showed simplified navigation logic, "The main portion of the Arduinocode—the loop—runs repeatedly, instructing the robot to act differently depending on whether or not it detects an obstacle. Various functions are called on to perform a task such as convert the voltage from a sensor to a distance or make the robot follow the row."



Dylan Horrocks (3rd from right) in Panama for the Peace Corps, where he designs and builds aqueducts and sanitation systems.

Do What You Love

Dylan Horrocks (BSEN 2013)

I remember it vividly. The last moments in my second home, also known as Chase Hall, handing in that last final, giving big farewell hugs to all the faculty, and racing to the doors to take on my next adventure. Some of us scored awesome jobs, some were accepted to graduate programs or medical school and I . . . well I did something a little different. I joined the United States Peace Corps. About a month after graduation, I was sent to Panama as an Environmental Engineer to design and build aqueduct and sanitation systems in rural communities.

On the first day, I moved in with a Panamanian family in a small town where I would have training for the next three months. The family didn't speak a single word of English so, challenging and awkward it was, it did help me become more fluid in my Spanish speaking abilities. Each morning we had four hours of Spanish class and in the afternoon, four hours of technical/cultural class to prepare us for the next two years. At the end of training, I was sent 14 hours away to a small coastal community, Barriada Trotman, which I currently call home.

Although the community is absolutely beautiful, and has all the fish and vegetables you can eat, the environmental health is in need of improvement. Since water is collected from local streams and open defecation is the norm, waterborne diseases are common, especially among the elderly and young children (and even Peace Corps volunteers). My job is primarily to educate the community about disease transmission and how to eliminate sickness through handwashing (most important), hygiene, toilets/latrines, and safe water. This has been my most challenging job in the Peace Corps. Teaching is easy, but getting people to change the behaviors and customs they have been doing for many generations takes tremendous time and effort.

For my second year, I will be working with the community building an aqueduct to supply potable water to most of the homes. To keep things sustainable and simple, the aqueduct is powered by the most reliable free energy: gravity! Along with design and construction of the aqueduct, I have been working to form a committee of community members that will serve as a governing body to manage and maintain the aqueduct after I have gone. This includes everything from financial bookkeeping to fixing broken tubes.

So far, Peace Corps has been one crazy ride, and I couldn't imagine myself elsewhere. I've learned and experienced so much that I consider invaluable. I recommend to anyone who is interested to start talking with advisors, recruiters, and even myself (rdhorrocks@gmail.com). Adiós and Go Big Red!

Dylan worked in rural Panama as an environmental health educator.

Coming & Going


Amir Haghverdi

Amir Haghverdi and **Daran Rudnick** (Ph.D. 2015) began positions as Assistant Professors in irrigation and agricultural water management over the summer. Rudnick is at West Central Research and Extension Center in North Platte. Haghverdi is at Panhandle Research and Extension Center in Scottsbluff.


Daran Rudnick


Troy Gilmore

Dr. Troy Gilmore joins our faculty in October filling the groundwater hydrologist position. He holds degrees from North Carolina State University and the University of Akron in the following major areas: Mechanical Engineering Technology, Civil and Environmental Engineering, Biological and Agricultural Engineering, Hydrology and Fluid Mechanics. His research interests are in instrumentation, hydrology, and biogeochemistry.


Nicole Iverson

Nicole Iverson joined BSE in Aug. as Assistant Professor and Biomedical Nanotechnology Specialist. She received a B.S. from University of Minnesota, 2003; M.S. Rutgers University, 2005; and Ph.D. University of Medicine and Dentistry of New Jersey and Rutgers University, 2010, all in Biomedical Engineering. Iverson's lab at UNL will further develop nitric oxide sensors for cancer treatments from her Massachusetts Institute of Technology post-doctoral fellowship research.


Jenna Hefley

Jenna Hefley is our Academic Services Coordinator. She received a B.A. in Human Services from Buena Vista University. She worked in student services positions the past 11 years, most recently at UM-KC School of Pharmacy in advising/recruiting. Previously she was admissions coordinator for Iowa Central CC.


Andrea Spader

Andrea Spader, Advising & Recruiting Coordinator, left the department in May to become the UNL College of Journalism and Mass Communication Advising Coordinator. Her contributions to BSE and involvement with programming for students, staff, and faculty will be missed.


Brandi Shepler

Brandi Shepler, was Personel Generalist for our department. She left the Filley Business Center for a job outside UNL.


Jill Schurr

Jill Schurr is the new Personnel Generalist for the Filley Business Center; she is officed in Chase Hall. She joins us from Oldfather Business Coop. in College of Arts & Sciences, where she spent 11 months working as a Personnel Associate. Previously, she managed financial and human resource aspects of large-scale projects.

Alum News

Sarah Gardels (BSEN 2013) worked in plant operations at Cargill for the last two years, processing soybeans and was the production supervisor over two departments. She returned to Omaha from North Carolina after having a baby in April. Her new job is in strategic sourcing and procurement, negotiating contracts and prices with vendors on capital projects for all of Cargill.

Kimberly Grieb (BSEN 2010) is working in Beatrice, NE at Flint Hills Resources as Health and Safety Manager.

Amy Johnson (M.S. 1997) is a Project Manager for the Northern Colorado Water Conservancy District, which jointly operates and maintains the Colorado-Big Thompson project with the U.S. Bureau of Reclamation. C-BT collects water on the West Slope, delivering it through a 13-mile tunnel beneath Rocky Mountain National Park to portions of eight counties. Projects range from planning, design, and construction, including permitting, engineering design, feasibility studies, and management.

Colton Knickman (MSYM 2014) is now Ord Production Supervisor with Cargill AgHorizons. While a student at BSE, he received scholarships from Case New Holland, John Deere, the Alvin J. Gard Scholarship, and a CASNR Ambassador Scholarship.

Ryan Propst (AGEN 1998) is now at Caterpillar as a 6 Sigma Black Belt.

Samuel Schmidt (MSYM 2010) works for The Agronomic Consulting Group in West Point, NE as General Manager.

Danielle Smith (BSEN 2012) is Capital Projects Manager at Cargill in Schuyler, NE.

Wayne Wolford of Cozad, 1958 alumnus (B.S. in Ag Engineering) died April 16, 2015 in Lincoln, NE at age 79. Wayne was a member of The Nebraska Society of Professional Engineers and the Mid-States Chapter of Professional Engineers. He is the father-in-law of **Dr. Mike Kocher**.

Promotions


Deepak Keshwani

Dr. Deepak Keshwani and **Dr. Adam Liska** have both been promoted to Associate Professor with continuous appointment (tenure).


Adam Liska

2015-2016 SCHOLARSHIPS AWARDED

Case New Holland	Isaac Frerichs (AGEN) Tyler Manning (AGEN) Marcus Sandberg (MSYM) Devon Vancura (AGEN)
Dirk & Janice Petersen	Christian Jewett (BSEN)
Dr. & Mrs. William E. Splinter	Jennifer Smith (AGEN)
Edgar Rogers Memorial	Michaela Horn (MSYM) Kerry McPheeters (MSYM)
Elenore Gakemeier Swarts Distinguished	Ellie Ahlquist (BSEN) Christopher Davidson (BSEN) Mitchell Maguire (BSEN)
Fred R. Nohavec	Paulina Guzek (BSEN)
George Milo Petersen	Ethan Mosel (MSYM)
Glen D. Chambers	Bennett Turner (AGEN)
Glenn J. & Maria L. Hoffman	Jennifer Wynn (AGEN)
Ivan D. Wood Memorial	Derek Bracht (MSYM) Mitch Herbig (MSYM) Jacob Rafert (MSYM)
Jochens Fund	Jordan Busboom (MSYM) Kyle Lindhorst (MSYM)
John Deere	Benjamin Barelman (MSYM) Jeremy Blackford (MSYM) Travis Classen (MSYM) Ian Fuchtman (MSYM) Latham Fullner (MSYM) Luke Johnson (AGEN)
John Sulek Memorial	Austin Kaufman (MSYM)
Ken Von Bargen Student Support	Anna Siebe (MSYM)
Leonard G. Schoenleber	Ravi Raghani (BSEN)
Lloyd W. & Margaret V. Hurlbut Memorial	Zak Kurkowski (AGEN) Anthony Zach (AGEN)
T-L Irrigation, Co. & Leroy W. & Jeane E. Thom	Micah Bolin (AGEN) Kelsey Bohling (AGEN) Dillon Clayton (AGEN) Matthew Erickson (MSYM) Ryan Hanousek (AGEN) Justin Herting (AGEN) Jonathon Jahnke (MSYM) Caleb Lindhorst (AGEN) Brendan Meyer (AGEN) Ethan Nutter (MSYM)
Mr. & Mrs. W. F. Hoppe, Sr. Memorial	Wyatt Kastl (MSYM)
Orve & Scott Hedden Memorial	Amanda Van Sant (AGEN)
Paul E. & Mary Beth Fischbach & Family	Brian Burris (BSEN) Dylan Rogers (BSEN)
Tom Thompson Memorial	Grant Uehling (MSYM)
Warren P. Person Memorial	Greg Frenzel (MSYM) Levi Schick (MSYM)
Wayne E. and Virginia R. Thurman	David Bunker (BSEN) Anna Toner (BSEN) Katelyn Watts (BSEN) Dillon Wordekemper (BSEN)

GRADUATION

MAY

AGEN
Austin Bollacker
Mitchell Goedeken
Jacob Harm
Philip Hochstetler
Isaiah Krutak
Robert Olsen
Luke Prosser
Dylan Smith
Anna Sorensen
Jake Walker
Casey Wallin

BSEN
John Bader
Matthew Benson
Alexander Beyersdorf
Jared Boyce
Bethany Brittenham
Julia Burchell
Erica Carder
Tu Anh Doan
Ellen Emanuel
Skylar Falter
Amy Fosler
Erica Geis
Connor Hansen
Calvin Harman
Emily Harrison
Matthew Hedrick
Eric Hofferber
Sara Hutcheson
Benjamin Joekel
Hayden Kaderly
Emily Klimisch
Ted Kocher
Megan Lush
Linka Mei
Ethan Monhollon
Spencer Moore
Rachel Morford
Aubrey Mueller
Matthew Pirog
James Sinclair
Hillary Stoll
David Szalewski
Claire Uryasz
Audrey Vacha
Riley Vanek
James Yong
Yehui Zhang

MSYM
Lucas Allen
Derek Durre
Chad Eckery
Timothy Frey
Jacob Hinrichsen
Jarod Ketter
Dylan Long
Brandon Niemann
Kelby Radney
Garrett Reese
Rachel Rosinski
Whitney Schultz
Huishu Shen
Taylor Weber
Justin Williams
YewhoWong

Master's Degree
Samuel Marx
Evordius Rulazi
Patrick Walsh
Gregory Williams

Ph.D.
Mohamed Amar
Krishnamoorthy Pitchai
Vivek Sharma
Pimsiree Suwan

AUGUST

AGEN
Felipe Alves

BSEN
Tasneem Bouzid
Brenden Lopp

Master's Degree
Gustavo Rubia Bosch
Dilshad Brar
Tsz Him Lo

Ph.D.
Jiajia Chen
Daran Rudnick

THE DEAN'S LIST *Spring Semester 2015*

AGEN
Kelsey Bohling
Micah Bolin
Nicholas Christensen
Julia Franck
Adam Frerichs
Mitchell Goedeken
Ryan Hanousek
Justin Herting
Benjamin Hintz
Luke Johnson
Caleb Lindhorst
Tyler Manning
Tobias Mantelato
Joshua Murman
Robert Olsen
Dylan Smith
Anna Sorensen

BSEN
Ellie Ahlquist
Freshta Baher
Matthew Ballweg
Victoria Bart
Emily Bender
Jared Beyersdorf
Conner Beyersdorf
Clayton Blagburn
Nicholas Bohlim
Tasneem Bouzid
Kenneth Bristol
Miranda Brockman
David Bunker
Madison Burger
Jocelyn Carter
Brinson Chapp
Connor Christensen
Hannah Christian
Aaron Cronican
Christopher Davidson
Rebekah DeFusco
Danielle DeGroote
Erica Dolph
Kyle Downey
Drew Dudley
Katherine Dudley
Zachary Duncan
Ellen Emanuel
Collin Erickson
Ben Everswick
Ryan Flynn
Mitchell Frischmeyer
Megan Gren
Devin Grier
Paulina Guzek
Connor Hansen
Calvin Harman
Blake Hass
Jason Hawkins
Matthew Hedrick
Erica Hedrick
Riley Heller
Austin Helmink
Philion Hoff
Eric Hofferber
Lindsey Hollmann
Lauren Hunt
Sara Hutcheson
Benjamin Joekel
Hayden Kaderly
Doussou Shannan Karibuhoye Said
Emily Klimisch
Pedro Leal Costa Donato
Jacob Lenz
David Lillyman
Samuel Lindblad
Brenden Lopp
Megan Lush
Alexander Magsam
Mitchell Maguire
Alison Manske
Marshall Mackenzie
Rachel Miller
Hunter Miller
Andrew Minarick
Mitchel Misfeldt
Michael Moeller
Luke Monhollon
Ligia Monteiro
Rachel Morford
Mallory Morton
Aubrey Mueller
Logan Neal
Troy Nelson
Tuan Anh Nguyen
Anna Petrow
Allyson Pietrok
Allison Porter
Ravi Raghani
Kevin Real
Kevan Reardon
Nathan Rice
Tiffany Riffle
Hunter Ringenberg
Dylan Rogers
Douglas Rowen
Deidre Sandall
Alyson Schulte
Nicole Schwery
Nicholas Seier
James Sinclair
David Smith
Dillon Soukup
Madison Spence
Joseph Stapleton
Erin Stevens
Hillary Stoll
David Szalewski
Jared Thomsen
Emily Thrailkill
Joseph Toalson
Anna Toner
Kevin Vakilzadian
Alex Van Lent
Riley Vanek
Jordan Verplank
Blake Wagner
Sophie Walsh
Katelyn Watts
Brett Whorley
Alexis Woodward
Elise Wordekemper
Dillon Wordekemper
James Yong
Carly Zimmer
Kristina Zvolanek

MSYM
Benjamin Barelman
Greg Frenzel
Turner Hagen
Michaela Horn
Craig Hruska
Troy McDonald
Kerry McPheeters
Ethan Nutter
Whitney Schultz
Grant Uehling

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To arrange a gift, contact:
Josh Egley, (CASNR/MSYM)
402-458-1202
jegley@nufoundation.org
OR
Karen Moellering (COE, AGEN/BSEN)
402-458-1179
kmoellering@nufoundation.org